P H I L I P S E L E C T R O N I C I N S T R U M E N T S
A DIVISION OF PHILIPS ELECTRONICS AND PHARMACEUTICAL INDUSTRIES CORP.
750 S. FULTON AVENUE, MT. VERNON, N. Y.

Report No. 2268
Date January 21, 1964

APPLICATION LABORATORY REPORT

SUBMITTER: The New Netherlands Coin Co., Inc.
Suite 401
1 West 47th Street
New York 36, N. Y.

CONTACT: Mr. D. Taxay

AREA OF INTEREST:

The qualitative determination of the elemental composition of rare coins.

INSTRUMENTATION:

Water Cooled Diffraction Unit, Constant Potential	Type #12215
Bulk Specimen Spectrograph, equipped with:	Type #52343
1) FA-60 Tungsten Target X-Ray Tube	Type #32168
2) Lithium Fluoride Analyzing Crystal	Type #52130
3) Scintillation Detector	Type #52245
Electronic Circuit Panel, equipped with:	Type #12096
1) Strip Chart Recorder	Type #52463

SAMPLE HISTORY AND PREPARATION:

A total of six coin samples were submitted. Four coins required x-ray analysis to determine whether they are genuine. Two additional coins were submitted for comparison purposes. In order to be genuine, each of the four coins must conform to the following specifications:

1. 1794 half dollar -	90% silver and 10% copper
2. 1913 nickel (die trial) -	Either 100% copper or 95% copper and 5% tin and zinc. If not die trial, 75% copper and 25% nickel
3. 1935 nickel (die trial) -	Same as No. 2.

SAMPLE HISTORY AND PREPARATION:

4. 1859 Indian Head Penny (die trial) - Either 100% copper or if not die trial, 88% copper and 12% nickel

The elemental composition of the two additional coins submitted as references is as follows:

1A. 1959 Quarter - 90% silver and 10% copper

1B. 1852 Copper Large Cent - 100% copper

Since all of the above mentioned coins are valuable in their present condition, the non-destructive x-ray identification required was performed with no sample preparation.

DATA:

The data obtained for this report consists of a series of strip chart recordings for the elements of interest. These strip chart recordings are identified as follows:

Scan #1 - Silver in the 1794 half dollar and the 1959 quarter

Scan #2 - Copper in the 1794 half dollar and the 1959 quarter

Scan #3 - Nickel, copper, and zinc in the 1913 nickel

Scan #4 - Nickel and copper in the 1935 nickel

Scan #5 - Nickel and copper in an ordinary nickel

Scan #6 - Copper in the 1859 Indian Head penny

Scan #7 - Copper in the 1852 copper large cent

Scan #8 - Copper in ordinary penny.

DISCUSSION:

The strip chart recordings attached to this report illustrate the concentrations of the elements of interest in each of the samples. Some discrepancies from the information supplied have been noted. For simplicity, each of the four coins of interest will be discussed separately.

#1 - 1794 Half Dollar:

This half dollar was compared to the 1959 quarter since the known composition of the quarter (90% silver and 10% copper) is the same as the composition of a genuine 1794 half dollar. Scans #1 and #2 show that this coin contains silver and copper in the same proportion as the quarter. No other elements were detected. Thus, the coin is apparently genuine.

#2 - 1913 Nickel:

Scan #3 demonstrates that this coin has a very high concentration of copper and very small amounts of zinc and nickel. The copper intensity indicates approximately 95% copper concentration. However, the remaining 5% consists of equal parts nickel and zinc. Although the specifications for this coin indicates that tin and zinc are the residual elements, we would still conclude that this coin is, in fact, a genuine die trial.

#3 - 1935 Nickel:

Scan #4 shows the copper and nickel intensities available from this coin. When compared to the relative intensities obtained from an ordinary nickel shown in scan #5, the obvious conclusion is that this coin is an ordinary nickel composed of 75% copper and 25% nickel.

#4 - 1859 Indian Head Cent:

Scan #6 illustrates the copper concentration in this coin. The composition is pure copper. No other elements were detected and the intensity obtained is approximately equivalent to that obtained from the 1852 copper large cent in Scan #7. The coin differs from an ordinary 1951 penny since no zinc is present. This difference is illustrated in scan #8. We would say that this Indian Head penny is a pure copper die trial.

CONCLUSIONS:

The Norelco Bulk Specimen Spectrograph has demonstrated its ability to identify the elemental composition of coins non-destructively. Three of the four coins submitted for analysis are genuine. The remaining coin, the 1935 nickel, is an ordinary nickel and not a die trial coin as previously supposed.

The analyses required were performed routinely and the data obtained may be used as permanent proof of the elemental composition of these coins.

Ann Dorenbosch
Ann Dorenbosch DL
Applications Engineer

W. J. Pfoser
W. J. Pfoser
Sales Engineer

AD/WJP/dl

July 22, 1966

Dr. Donald W. Bach
The Hollydale Chiropractic Center
13601 Paramount Blvd.
South Gate, California

Dear Dr. Bach:

Dave Cooper has turned over to me your letter of July 5, 1966 with respect to the 1913 Buffalo Nickel Type II in copper compound. If I had known that you were looking for the coin since 1958 I would have advised you earlier as one of our purposes is to aid in research.

The piece was in the same special container as the 1913 Liberty Nickel fantasies which were owned by Colonel Green. We have this container and will exhibit it along with the coin.

As to whether it is similar to other 1913 Type II nickels, I will check this the next time I am at the bank vault.

An X-ray metal analysis has been made of the coin in question and it is 95% copper. There is a great deal of information on it in my file.

We are glad to be helpful to you.

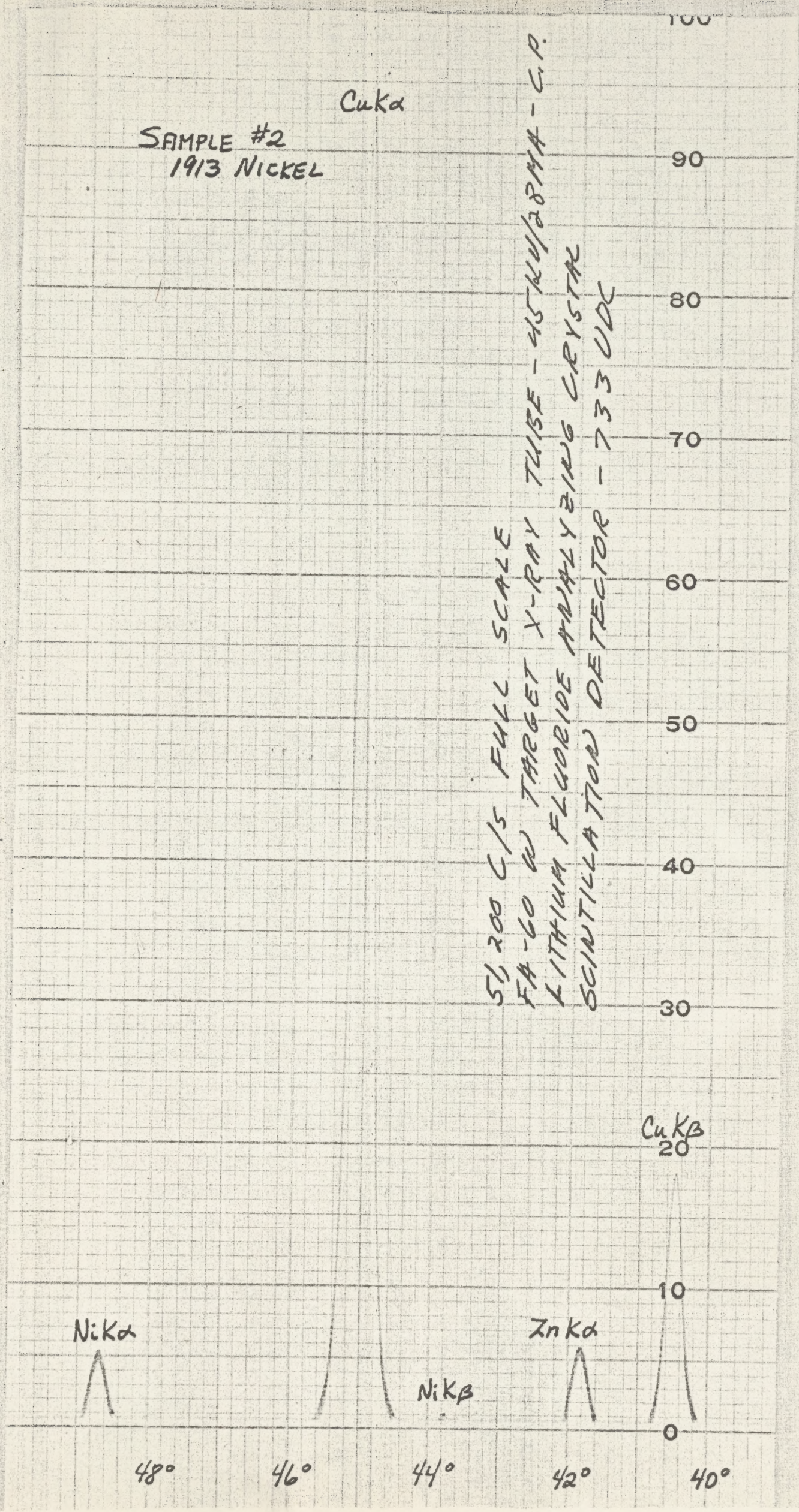
Sincerely yours,

ERIC P. NEWMAN NUMISMATIC
EDUCATION SOCIETY

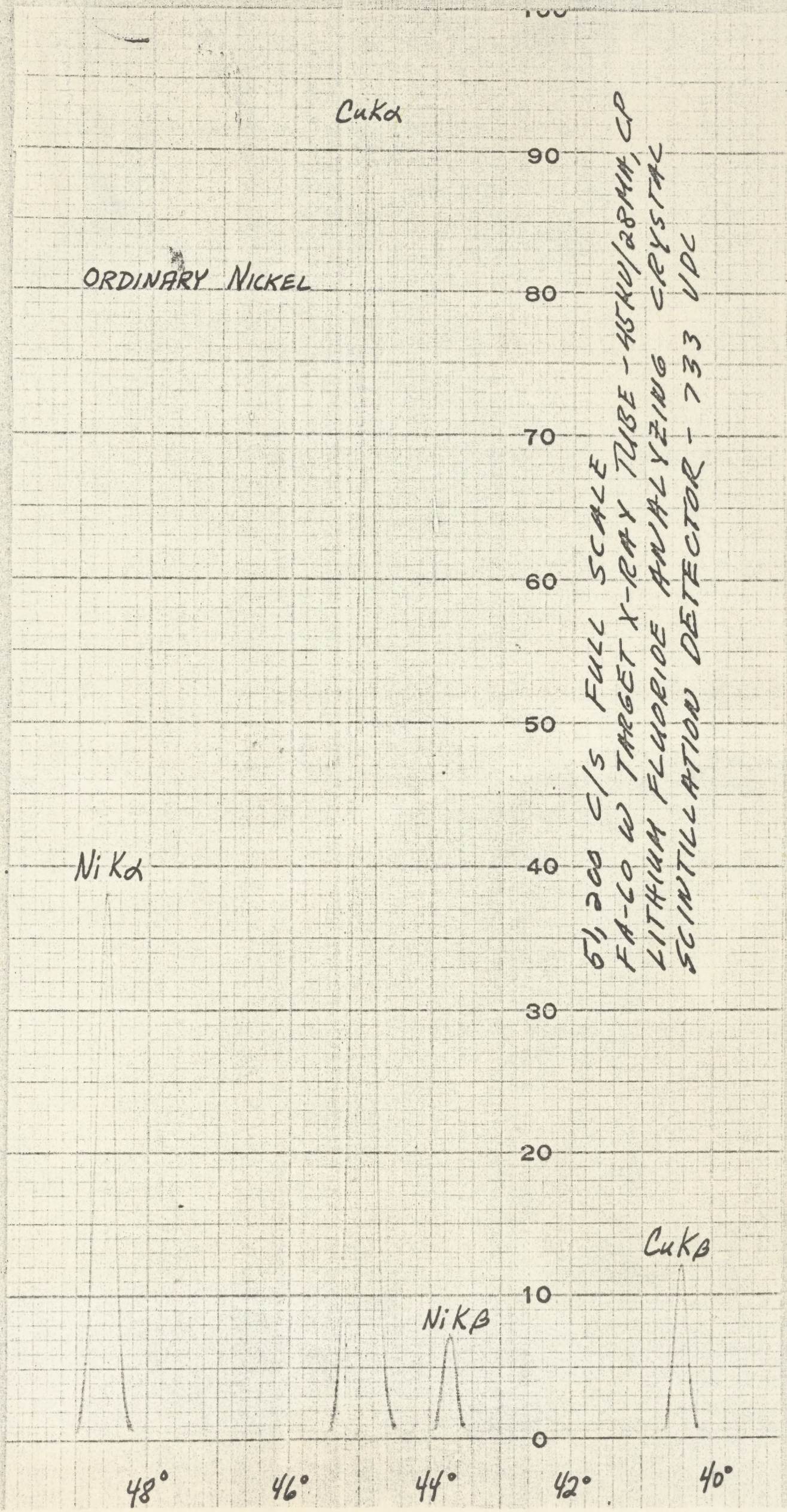
EPN/atb

CC: Mr.Dave Cooper

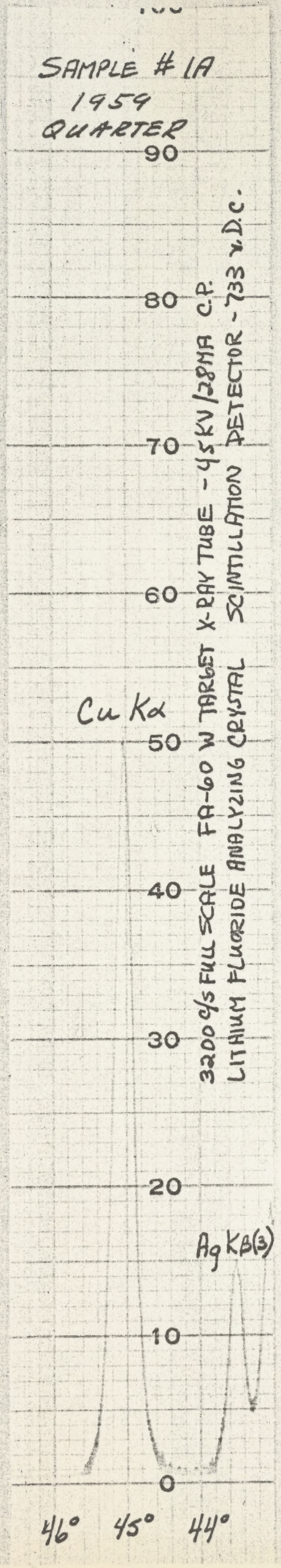
#3

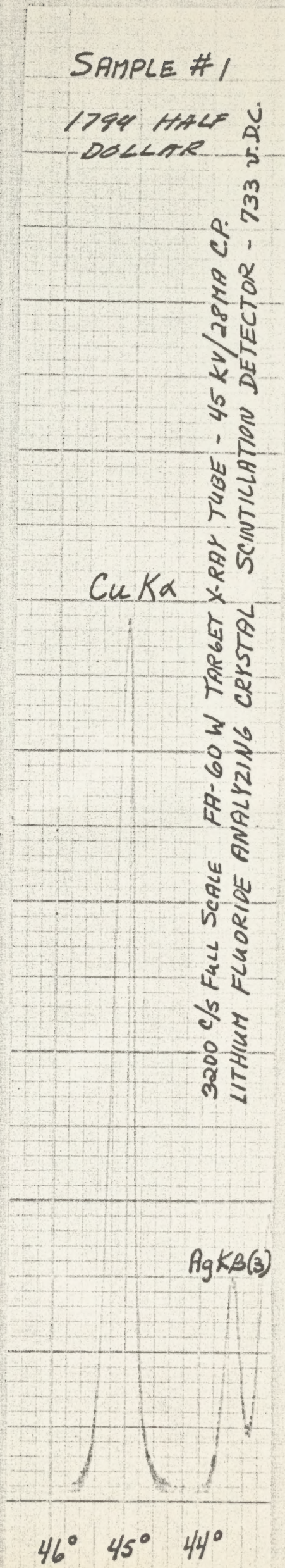

Cuka
SAMPLE #2
1913 NICKEL
5½ 200 C/S FULL SCALE
FA -60 W TARGET X-RAY TUBE - 45KV/28MA - C.P.
LITHIUM FLUORIDE MONOCHROMATOR CRYSTAL
SCINTILLATION DETECTOR - 733 UDC
100
90
80
70
60
50
40
30
20
10
0
Cu Kβ
Ni Kα
Ni Kβ
Zn Kα
48°
46°
44°
42°
40°

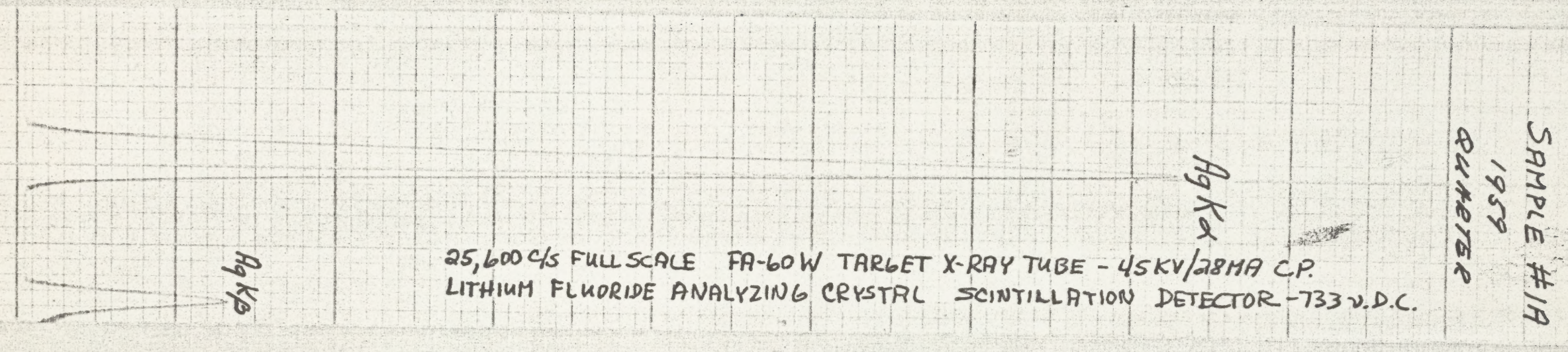
#5

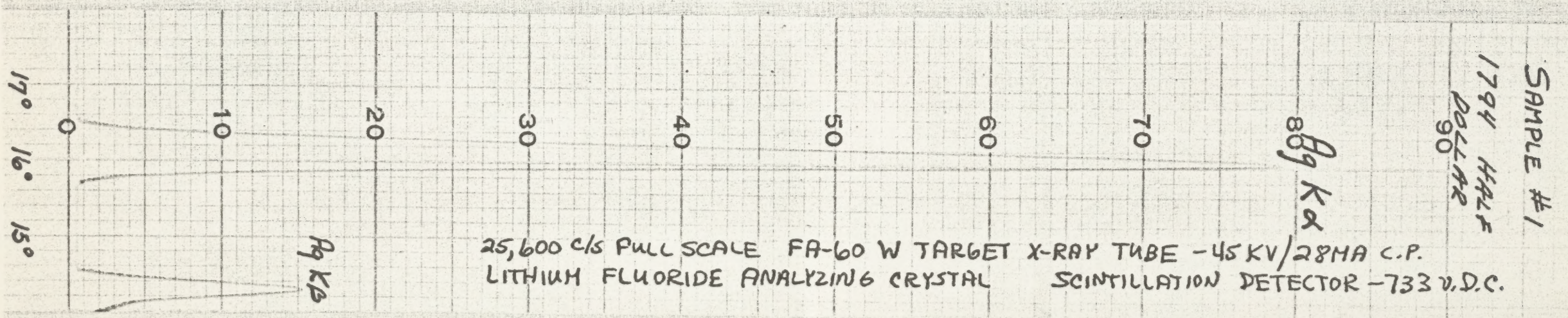

CuKα
ORDINARY NICKEL
NiKα
NiKβ
CuKβ
90
80
70
60
50
40
30
20
10
0
48°
46°
44°
42°
40°
5½ 200 C/S FULL SCALE
FA-CO W TARGET X-RAY TUBE - 45KV/28MA, CP
LITHIUM FLUORIDE ANALYZING CRYSTAL
SCINTILLATION DETECTOR - 733 VDC

#2


SAMPLE #1A
1959
QUARTER
3200 c/s FULL SCALE FA-60 W TARGET X-RAY TUBE - 45 KV/28MA C.P.
LITHIUM FLUORIDE ANALYZING CRYSTAL SCINTILLATION DETECTOR - 733 v.D.C.
Cu Kα
Ag Kβ(3)
90
80
70
60
50
40
30
20
10
0
46°
45°
44°

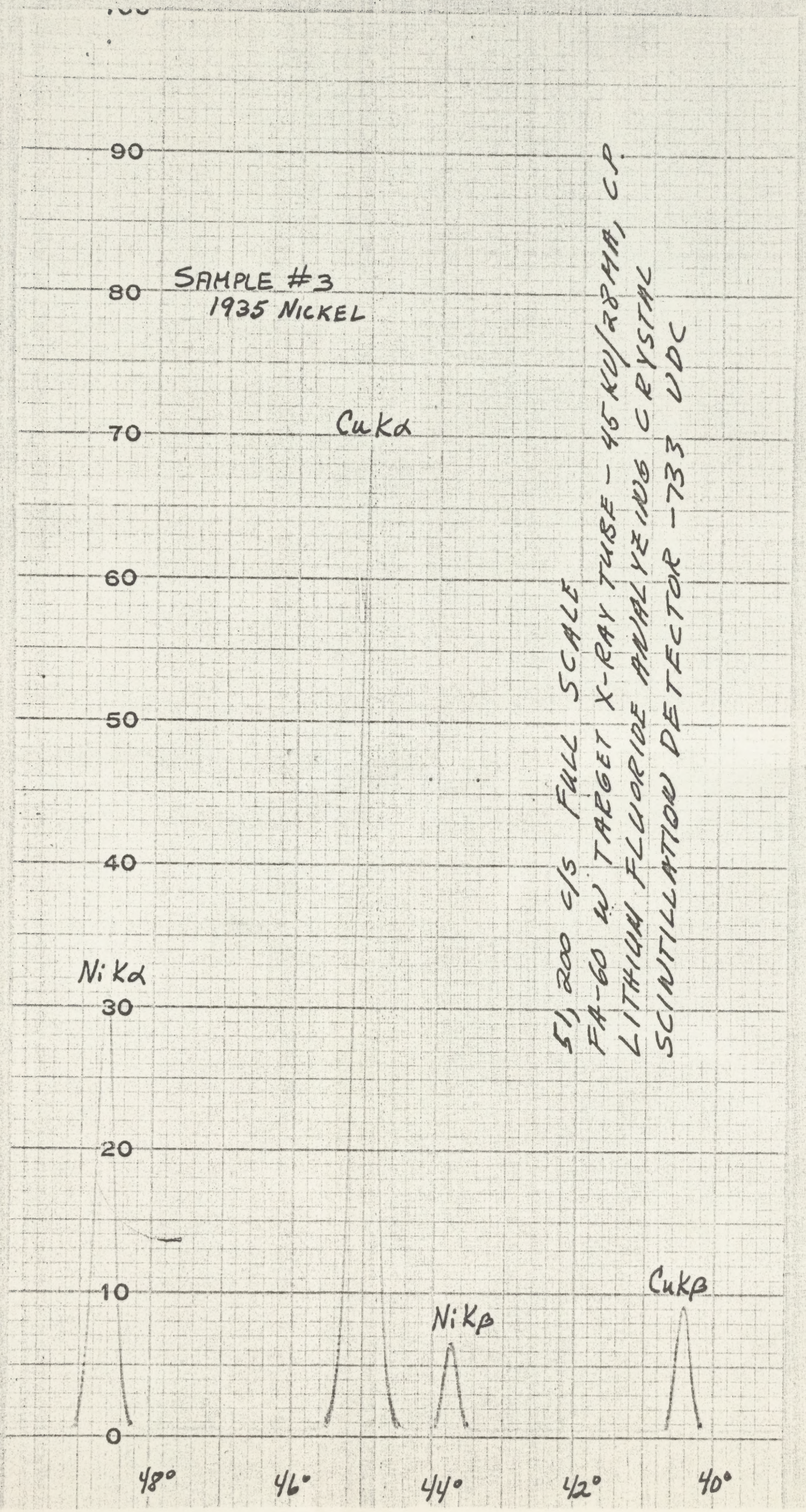

SAMPLE #1
1794 HALF
DOLLAR
3200 c/s FULL SCALE FA-60 W TARGET X-RAY TUBE - 45 KV/28MA C.P.
LITHIUM FLUORIDE ANALYZING CRYSTAL SCINTILLATION DETECTOR - 733 v.D.C.
Cu Kα
Ag Kβ(3)
46°
45°
44°


SAMPLE #1A
1959
QUARTER
Ag Kα
Ag Kβ
15°
16°
17°
25,600 C/S FULL SCALE FA-60W TARGET X-RAY TUBE - 45KV/28MA C.P.
LITHIUM FLUORIDE ANALYZING CRYSTAL SCINTILLATION DETECTOR -733 V.D.C.

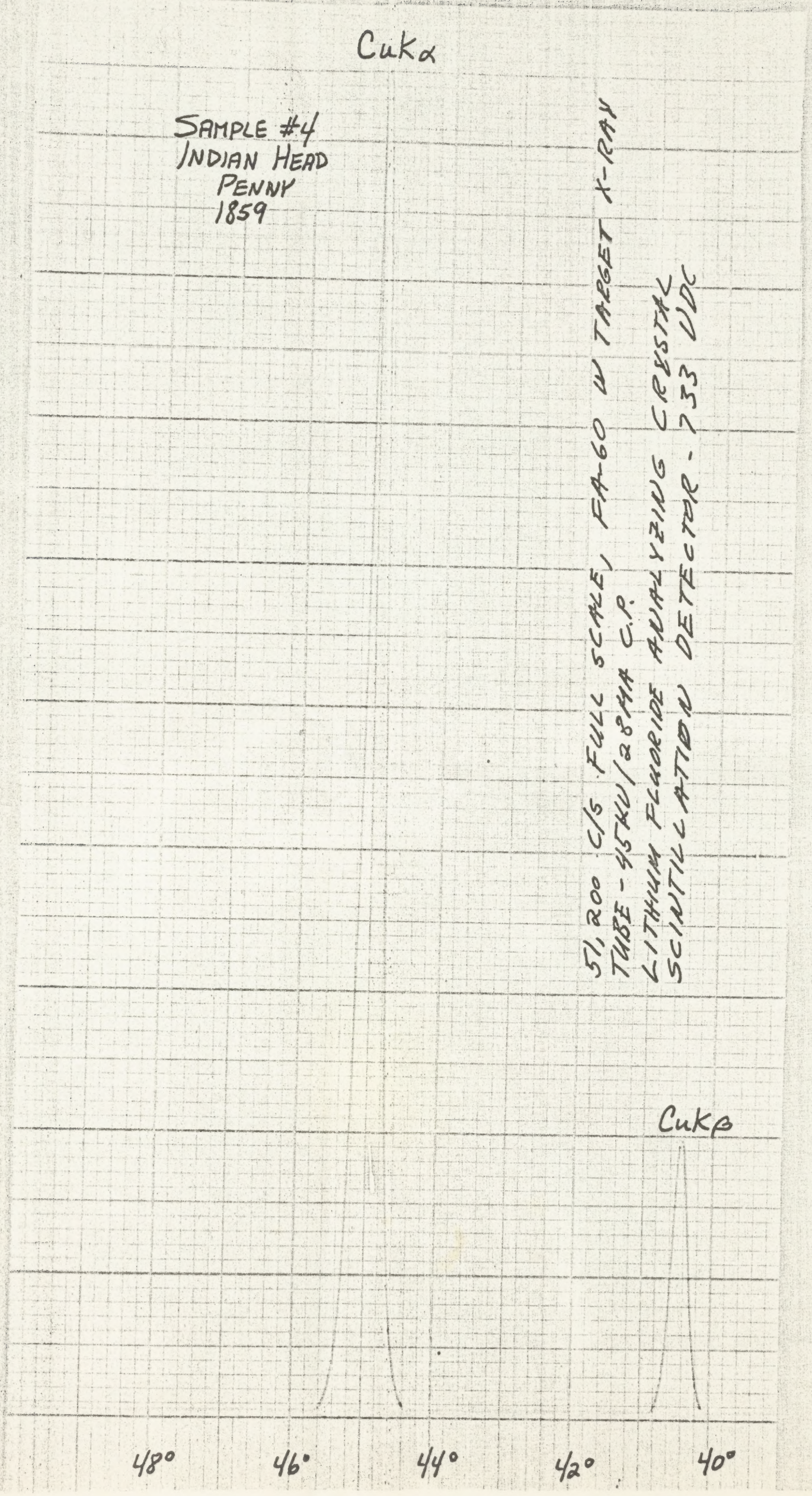

SAMPLE #1
1794 HALF
DOLLAR
0
10
20
30
40
50
60
70
80
90
Ag Kα
Ag Kβ
15°
16°
17°
25,600 C/S FULL SCALE FA-60 W TARGET X-RAY TUBE -45 KV/28MA C.P.
LITHIUM FLUORIDE ANALYZING CRYSTAL SCINTILLATION DETECTOR -733 V.D.C.

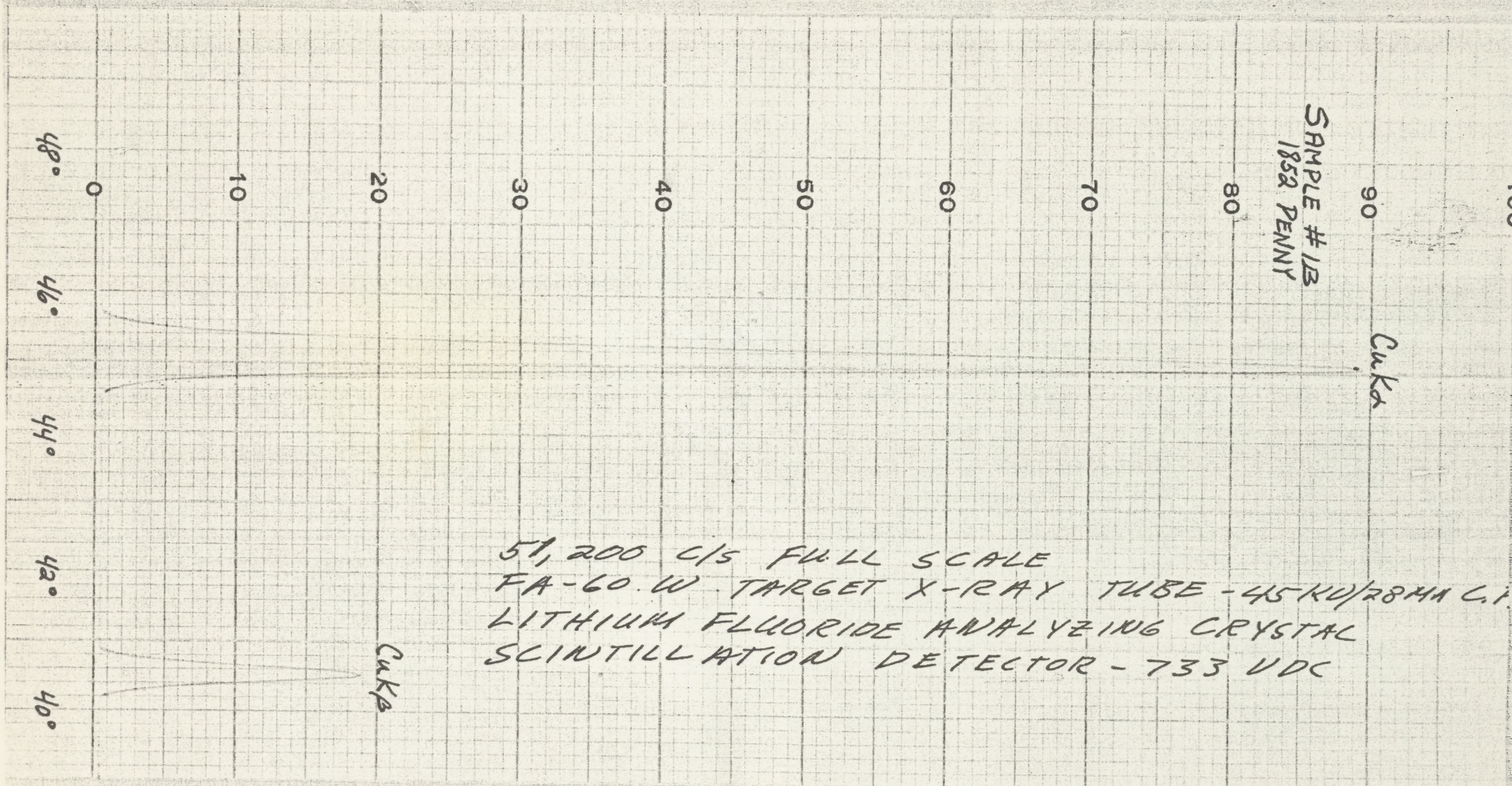
#1

#4


SAMPLE #3
1935 NICKEL
CuKα
NiKα
NiKβ
CuKβ
90
80
70
60
50
40
30
20
10
0
48°
46°
44°
42°
40°
SCALE
51,200 c/s FULL
FA-60 w/ TARGET X-RAY TUBE - 45 KV/28MA, C.P.
LITHIUM FLUORIDE ANALYZING CRYSTAL
SCINTILLATION DETECTOR -733 VDC

#6

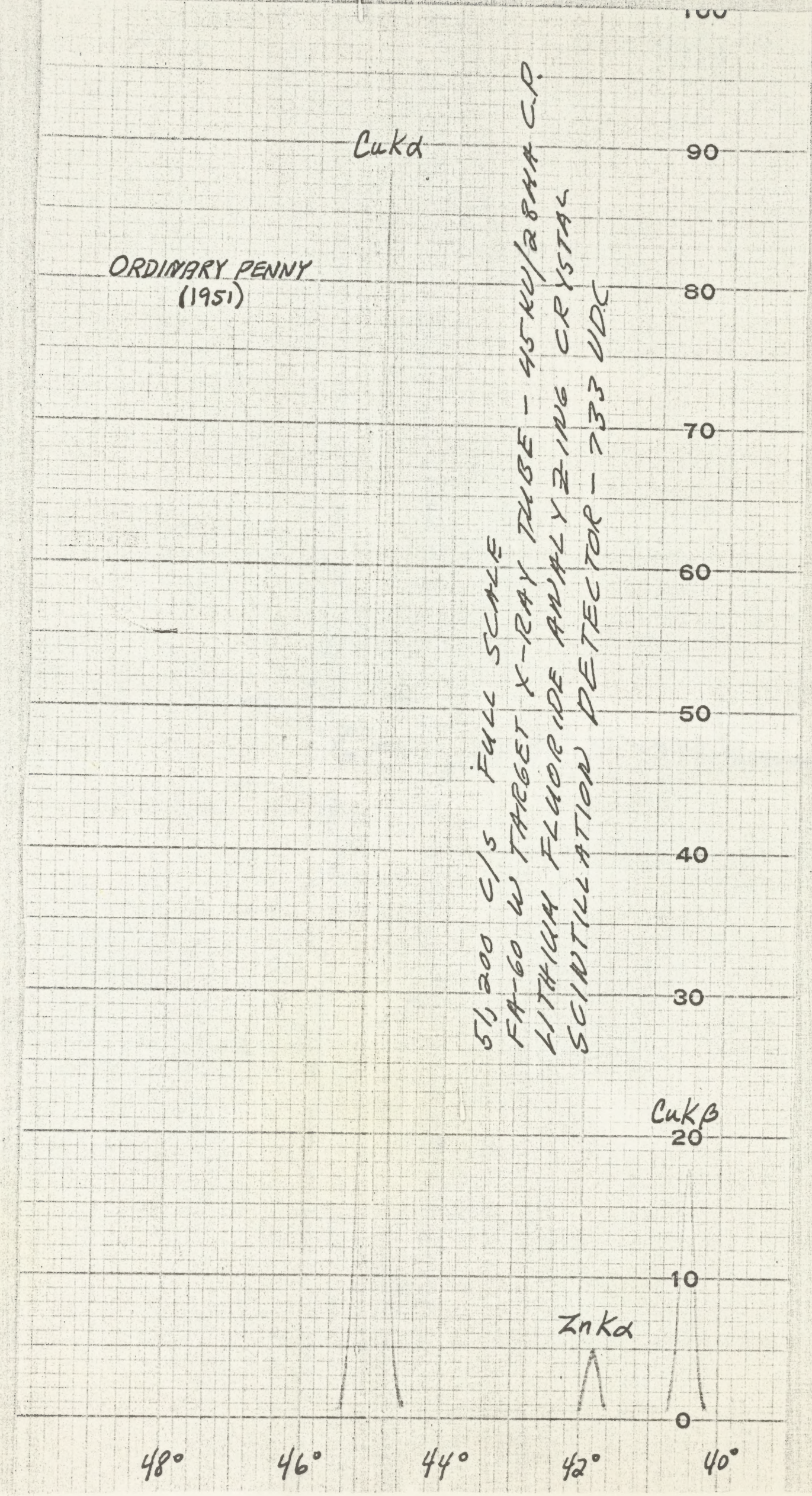

CuKα
SAMPLE #4
INDIAN HEAD
PENNY
1859
51,200 C/S FULL SCALE, FA-60 W TARGET X-RAY
TUBE - 45KV/28MA C.P.
LITHIUM FLUORIDE ANALYZING CRYSTAL
SCINTILLATION DETECTOR - 733 VDC
CuKβ
48°
46°
44°
42°
40°

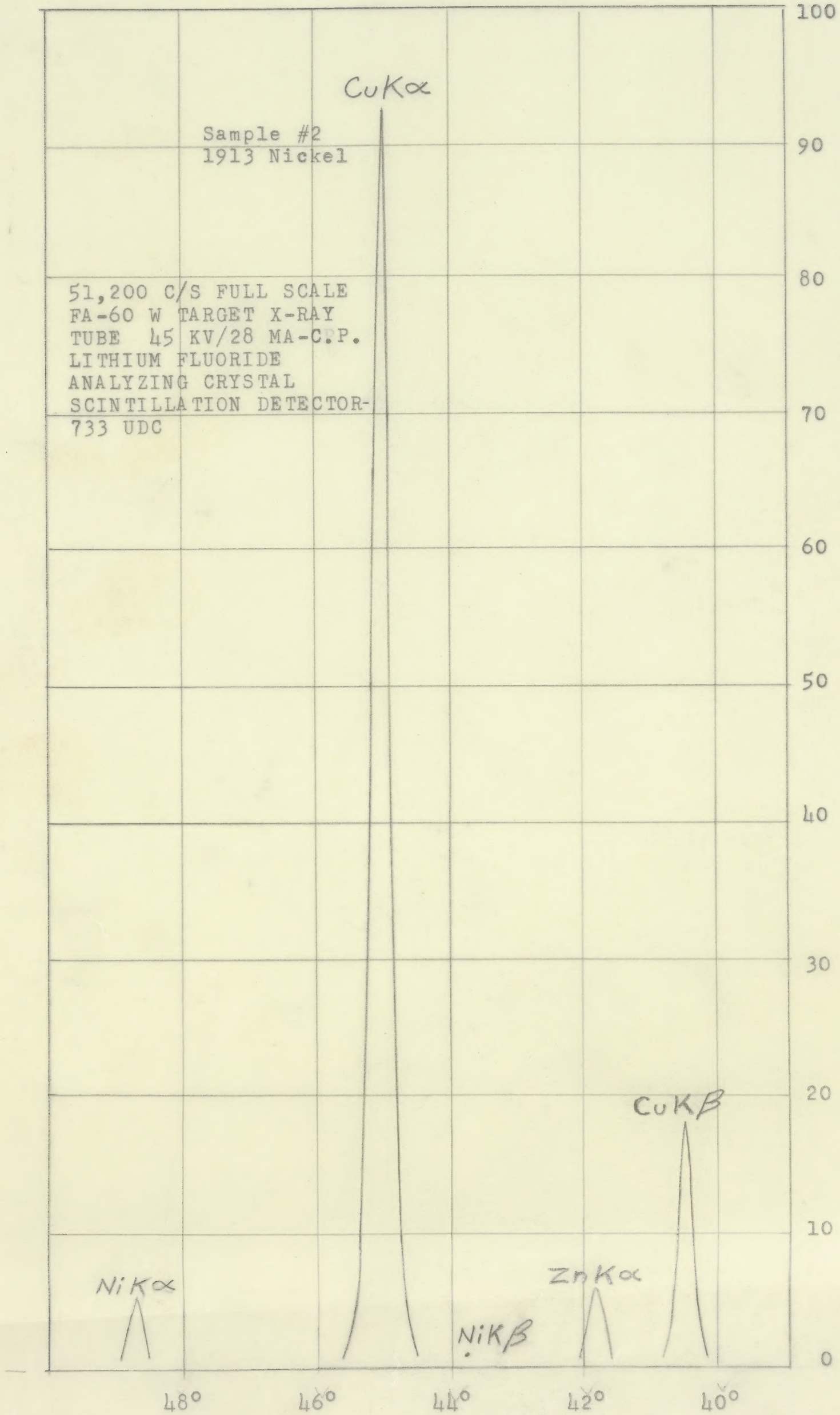


51,200 C/S FULL SCALE
FA-60. W. TARGET X-RAY TUBE - 45 KV/28 MA C.I.
LITHIUM FLUORIDE ANALYZING CRYSTAL
SCINTILLATION DETECTOR - 733 VDC

#7

8


5/200 C/S FULL SCALE
FA-60 W TARGET X-RAY TUBE - 45KV/28MA C.P.
WITH W FLUORIDE ANALYZING CRYSTAL
SCINTILLATION DETECTOR - 733 UDC
ORDINARY PENNY
(1951)
CuKα
CuKβ
ZnKα
100
90
80
70
60
50
40
30
20
10
0
48°
46°
44°
42°
40°


CuKα
Sample #2
1913 Nickel
51,200 C/S FULL SCALE
FA-60 W TARGET X-RAY
TUBE 45 KV/28 MA-C.P.
LITHIUM FLUORIDE
ANALYZING CRYSTAL
SCINTILLATION DETECTOR-
733 UDC
NiKα
NiKβ
ZnKα
CuKβ
100
90
80
70
60
50
40
30
20
10
0
48°
46°
44°
42°
40°